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67097-023; 11106

**UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant: Ellington et al.  
Serial No.: 10/786,707  
Filed: 02/25/2004  
Art Unit: 1723  
Examiner: Fortuna, Ana M.  
Title: **METHOD FOR PRODUCING A NON-POROUS  
MEMBRANE**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**APPEAL BRIEF**

Dear Sir:

Subsequent to the Notice Appeal filed October 9, 2007, Appellant now submits its Appeal Brief. Please charge \$510.00 for the Appeal Brief to Deposit Account No. 21-0279 in the name of United Technologies Corporation. If additional fees are necessary, you are hereby authorized to charge the above-referenced account.

**Real Party in Interest**

The real parties in interest are United Technologies Corporation and Membrane Technology and Research, Inc., assignees of the present invention.

**Related Appeals and Interferences**

There are no related appeals or interferences.

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67097-023; 11106**Status of Claims**

Claims 1-5 of the subject application were previously withdrawn, and claim 20 was previously cancelled. Claims 6-19 and 21-26 stand rejected and are appealed.

**Status of Amendments**

All amendments have been entered.

**Summary of Claimed Subject Matter**

The subject application relates to a method for producing a non-porous membrane 16 (e.g., Figure 4) and a fuel deoxygenator device 14 (e.g., Figure 2) that uses the non-porous membrane 16 to remove dissolved oxygen from fuel. The disclosed examples of the application are embodied in two independent claims, claims 6 and 16, which are briefly summarized as follows:

Independent claim 6 is directed to a method of manufacturing a non-porous membrane device 14 and includes forming a first membrane layer 66 in a first coating process (e.g., Figure 5) by drying a first solution in a first drying process (page 7, paragraph 28, lines 1-12; page 9, paragraph 35, lines 1-12) and forming a second membrane layer 68 on top of the first membrane layer in a second coating process (e.g., Figure 5) by drying a second solution in a second drying process (page 7, paragraph 29, lines 1-7; page 10, paragraph 38, lines 1-5). The second membrane layer 68 and the first membrane layer 66 form a non-porous membrane 16, which is then disposed in a fluid separating device 14.

Independent claim 16 is somewhat similar to independent claim 6 but is directed to a fluid separator 14 apparatus. The fluid separator 14 includes a first membrane layer 66, a second membrane layer 68 disposed on top of the first membrane layer 66, and an indistinct, seamless boundary (see dashed line of Figure 7) between the first membrane layer 66 and the second membrane layer 68.

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67097-023; 11106**Grounds of Rejection to be Reviewed on Appeal**

- I. Whether claims 16-19 and 21-23 were properly rejected under 35 U.S.C. §102(b) as being anticipated by WO98/35739 (hereafter WO '739).
- II. Whether claims 16-18 were properly rejected under 35 U.S.C. §102(b) as being anticipated by WO02/11868 (hereafter WO '868).
- III. Whether claims 6-14 were properly rejected under 35 U.S.C. §103(a) as being unpatentable over WO '739 in view of U.S. Patent 5,051,114 to Nemser, et al. (hereafter "Nemser"), and alternatively in view of U.S. Patent 5,116,650 to Bowser (hereafter "Bowser").
- IV. Whether claim 15 was properly rejected under 35 U.S.C. §103(a) as being unpatentable over WO '739 in view of Nemser, and further in view of U.S. Patent 6,709,492 to Spadaccini, et al. (hereafter "Spadaccini") or U.S. Patent 7,041,154 to Staroselski, et al. (hereafter "Staroselski").

**Arguments****I. Rejection of Claims 16-19 and 21-23 Under §102(b) over WO '739****(i) Claims 16-19 and 21-23**

The Examiner argues that the WO '739 reference discloses all of the limitations of independent claim 16, including the "indistinct, seamless boundary" between the two membrane layers. However, the WO '739 reference does not appear to disclose the claimed seamless boundary in an identical description of the claimed invention as required under §102(b). The Examiner relies on other references that are mentioned in WO '739 and argues that if the multilayer membrane of WO '739 is made using techniques disclosed in the other references while the first layer is wet, a "seamless boundary" would be formed. Respectfully, the other references also do not appear to disclose the claimed seamless boundary either, but the Examiner concludes that using the techniques of these references could achieve the claimed seamless boundary. The Examiner appears to be guessing or speculating that utilizing the techniques of these references would result in the seamless boundary as claimed. Such speculation does not constitute an identical description of the claimed invention as required by 102(b). Indeed, since

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the "wet" technique of WO '868 (cited in another rejection; see p.16, lines 23-27) specifically produces visible/distinct layers, it is doubtful that depositing the second layer while the first layer is wet as the Examiner suggests would achieve the claimed indistinct, seamless boundary. Accordingly, Appellant respectfully requests that the rejection of claims 16-19 and 21-23 be withdrawn.

Additionally, the Examiner argues that the claimed membrane constitutes a single membrane layer independent of the manufacturing process and that a single layer as disclosed by WO '739 would therefore include a "seamless boundary." Respectfully, Appellant disagrees with the Examiner's reasoning because interpreting the single membrane layer of the WO '739 reference as being equivalent to the two claimed membrane layers improperly reads the limitation of having two membrane layers out of the claims. That is, independent claim 16 specifically recites a first membrane layer and a second membrane layer and, irregardless of the seamless boundary therebetween, the single membrane layer of the WO '739 reference should not be interpreted as two layers. For this additional reason, Appellant respectfully requests that the rejection of claims 16-19 and 21-23 be withdrawn.

(ii) Claim 22

In addition to the reasons stated above, the rejection of dependent claim 22 should be withdrawn for the following reasons. Claim 22 recites that "the first membrane layer and the second membrane layer each include a thickness of about 1 micrometer." The WO '739 reference does not appear to disclose a multilayer structure wherein the layers are each about 1 micrometer thick. In fact, the WO '739 reference appears to teach against using such a multilayer structure. The WO '739 reference suggests that multiple coatings would only be used when the thickness exceeds the thickness range of 0.5 - 6 micrometers (see p. 3, lines 24-28). For this additional reason, Appellant respectfully requests that the rejection of dependent claim 22 be withdrawn.

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## II. Rejection of Claims 16-18 Under §102(b) over WO '868

The Examiner argues that the WO '868 reference discloses all of the limitations of independent claim 16, including the "indistinct, seamless boundary" between the two membrane layers. However, the WO '868 reference does not appear to disclose the claimed seamless boundary in an identical description of the claimed invention as required under §102(b). The WO '868 reference appears to teach that two neighboring layers having different pores sizes will exhibit two distinct zones that are clearly visible because of the differing pore sizes (p.16, lines 24-25). Thus, although the WO '868 reference describes a "seamless" transition in another example (p.17, line 1), the "seamless" transition is not indistinct as in the subject claims because the neighboring zones would be visible due to the differing pore sizes. Accordingly, the WO '868 reference does not disclose all of the limitations of claim 16-18 and Appellant respectfully requests that the rejection be withdrawn.

## III. Rejection of Claims 6-14 and 24-26 Under §103(a) Over WO '739 and Nemser or Bowser

The Examiner contends that the WO '739 reference teaches a composite membrane having multiple layers and admits that this reference does not disclose a drying step between forming the layers. The Examiner relies on Nemser, or alternatively Bowser, to teach drying. However, Nemser only teaches making a single layer, not multiple layers. Therefore, Nemser should not be relied upon for teaching drying between forming multiple layers because it only discloses forming a single layer. Regarding Bowser, even though multiple layers may be formed, there is no suggestion that the techniques of Bowser would achieve the claimed seamless boundary. Thus, neither Nemser nor Bowser provide a reason for using drying before forming a subsequent layer to form a seamless boundary as claimed. For this reason, claims 6-14 and 21-23 are allowable and the rejection should be withdrawn.

Additionally, the rejection does not establish *prima facie* obviousness. The rejection states that a reason for incorporating drying into the WO '739 reference would be to control membrane permeability as suggested in Nemser. However, as discussed above, Nemser is directed to forming a single layer, not multiple layers. Therefore, even though Nemser teaches

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drying in the process of forming a single layer, Nemser should not be interpreted to provide any direction of how to form a multiple layer membrane having a seamless boundary. For this additional reason, Appellant respectfully requests that the rejection of claims 6-14 and 24-26 be withdrawn.

IV. Rejection of Claim 15 Under §103(a) Over WO '739 and Nemser and Spadaccini or Staroselski

Appellant has presented arguments on several occasions (see responses of 18 December 2006, 4 June 2007, and Pre-Appeal Brief of 9 October 2007) that the Spadaccini and Staroselski references should be disqualified as prior art under 35 U.S.C. §103(c) as being commonly owned at the time the subject invention was made. To establish sufficient evidence of common ownership at the time the invention was made, an Applicant or agent of record can state in a clear and conspicuous manner that the alleged reference was, at the time of the invention of the subject application, commonly owned by the company. See MPEP 706.02(l)(2). This statement alone is sufficient evidence to disqualify an alleged reference from being used in a rejection under §103(a). Thus, Appellant's clear and conspicuous statements that Spadaccini and Staroselski were commonly owned at the time the subject invention was made meets the requirements of establishing common ownership and disqualifying the Spadaccini and Staroselski references. Despite making this known to the Examiner on the occasions listed above, the Examiner has not acknowledged or even commented on disqualification of these references. For the reasons stated above, Appellant maintains that the references should be disqualified and that the rejection of claim 15 under §103 should be withdrawn. Furthermore, since claim 15 is not included in any other rejection, claim 15 should be allowed in independent form, including all of the features of the base claim and any intervening claims.

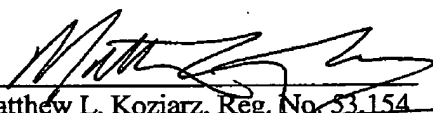
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**CLOSING**

For the above reasons, the final rejection of claims 6-19 and 21-26 are improper and should be reversed.

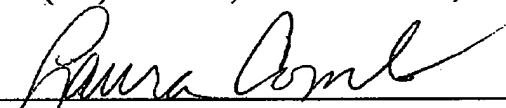
Respectfully submitted,

  
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Dated: December 10, 2007

**CERTIFICATE OF TRANSMISSION UNDER 37 CFR 1.8**

I hereby certify that this correspondence is being facsimile transmitted to the United States Patent and Trademark Office, fax number (571) 273-8300, on December 10, 2007.

  
Laura Combs

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6. A method of manufacturing a non-porous membrane device comprising the steps of:

forming a first membrane layer in a first coating process by drying a first solution in a first drying process;

forming a second membrane layer on top of the first membrane layer in a second coating process by drying a second solution in a second drying process, the second membrane layer and the first membrane layer form a non-porous membrane; and

disposing said non-porous membrane in a fluid separating device.

7. The method as recited in claim 6, including the step of disposing the non-porous membrane on a substrate.

8. The method as recited in claim 6, including the step of forming a partially dissolved portion of the first membrane layer by partially dissolving the first membrane layer with the second solution so that the second membrane layer forms a single homogenous non-porous membrane with the first membrane layer after the second drying process.

9. The method as recited in claim 6, wherein the first solution comprises an amorphous glassy perfluorodioxole copolymer dissolved in a fluorosolvent that has a boiling point between 60°C and 110°C.

10. The method as recited in claim 6, wherein the second solution comprises an amorphous glassy perfluorodioxole copolymer dissolved in a fluorosolvent that has a boiling point between about 60°C and about 110°C.

11. The method as recited in claim 6, wherein said first drying process includes the step of heating to between about 130°C and about 150°C for between 10 minutes and about 30 minutes.



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12. The method as recited in claim 6, wherein said second drying process includes the step of heating to between about 130°C and about 150°C for between 10 minutes and about 30 minutes.

13. The method as recited in claim 6, wherein said first coating process includes rolling said first solution onto said substrate.

14. The method as recited in claim 6, wherein said second coating process includes rolling said second solution on top of said first membrane layer after said first drying process.

15. The method as recited in claim 6, wherein said fluid separating device is a fuel deoxygenator of an aircraft.

16. A fluid separator comprising:  
a first membrane layer;  
a second membrane layer disposed on top of said first membrane layer; and  
an indistinct, seamless boundary between the first membrane layer and the second membrane layer.

17. The fluid separator as recited in claim 16, wherein said fluid separator is disposed on a substrate.

18. The fluid separator as recited in claim 16, wherein at least one of said first membrane layer and said at least a second membrane layer is formed from a fluoropolymer.

19. The fluid separator as recited in claim 18, wherein at least one of said first membrane layer and said at least a second membrane layer is formed from an amorphous glassy perfluorodioxole copolymer.

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21. The fluid separator as recited in claim 16, wherein the first layer is a first-formed layer and the second layer is a later-formed layer relative to the first-formed layer.
22. The fluid separator as recited in claim 16, wherein the first membrane layer and a second membrane layer each include a thickness of about one micrometer.
23. The method as recited in claim 6, further comprising forming the first membrane layer with a thickness of about one micrometer and forming the second membrane layer with a thickness of about one micrometer.
24. The method as recited in claim 6, wherein the first drying process occurs before the second coating process.
25. The method as recited in claim 6, further comprising forming a seamless boundary between the first membrane layer having a thickness of about one micrometer and the second membrane layer having a thickness of about one micrometer.
26. The method as recited in claim 6, wherein the first solution and the second solution are equivalent to form the first membrane layer and the second membrane layer of a single type of polymer.

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**EVIDENCE APPENDIX**

None.

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**RELATED PROCEEDINGS APPENDIX**

None.